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EXAMINER	
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2633	

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/053,560	MAENO, YOSHIHARU	
	Examiner	Art Unit	
	Christina Y. Leung	2633	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on _24 January 2002_.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) _1-122_ is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) _24-49_ is/are allowed.

6)☒ Claim(s) _1-6,10-15,19,20,50-54,58-62,66,70-78,82-92,97-105,109-114,118 and 119_ is/are rejected.

7)☒ Claim(s) _7-9,16-18,21-23,55-57,63-65,67-69,79-81,93-96,106-108,115-117 and 120-122_ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on _24 January 2002_ is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _09 July 2002_.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other: _____.

DETAILED ACTION

Priority

1. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Double Patenting

2. Applicant is advised that should claim 60 be found allowable, claim 62 will be objected to under 37 CFR 1.75 as being a substantial duplicate thereof. When two claims in an application are duplicates or else are so close in content that they both cover the same thing, despite a slight difference in wording, it is proper after allowing one claim to object to the other as being a substantial duplicate of the allowed claim. See MPEP § 706.03(k).

3. In this case, based on Applicant's other claims, Examiner respectfully suggests that Applicant amend claim 62 so that it depends on claim 61 instead of claim 59.

Claim Rejections - 35 USC § 112

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 85-88, 93, and 99 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 85, 86, and 88 recite "the control channel terminators in the first and second optical communication devices" and "the control channel terminators in the opposed WDM transmission equipments" in each claim. There is insufficient antecedent basis for this limitation in the claim because the parent claims on which they depend do not previously recite control

channel terminators in the first and second optical communication devices or in the opposed WDM transmission equipments.

Also, claims 87 and 88 currently depend directly or indirectly on claim 86, but claim 87 recites many of the same limitations as claim 84 (on which claim 86 already depends). Claim 88 also recites steps that overlap the steps recited in claim 86. The claims are indefinite because it is unclear whether the claims are reciting additional steps or limitations which modify already recited steps. Based on other claims and Applicants' specification, Examiner respectfully notes that claim 87 may depend directly on claim 82 (instead of depending on claim 86 and including all the limitations of claims 84 and 86 in addition to those of claim 82 as currently recited).

Claim 93 recites "the opposed WDM transmission equipments" in line 4 of the claim. There is insufficient antecedent basis for this limitation in the claim because claim 82 on which claim 93 depends does not recite opposed WDM transmission equipments. Examiner respectfully notes that 93 may depend on claim 84 instead.

Claim 99 recites "the first and second optical communications devices" in line 2 of the claim. There is insufficient antecedent basis for this limitation in the claim because claim 99 on which the claim depends only generally recites "individual devices in an optical link" and not first and second optical communications devices.

Claim Rejections - 35 USC § 102

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

7. Claims 97-99 are rejected under 35 U.S.C. 102(e) as being anticipated by Wang et al. (2002/0041413 A1).

Regarding claims 97 and 98, Wang et al. disclose an optical switch equipment (Figure 1B) wherein the common portion of attribute informations owned by individual devices (i.e., databases at each of nodes 10-14) in an optical link, to which an own device belongs, is the attribute information of the optical link, wherein the optical link is treated as an error in the absence of the common portion (page 1, paragraphs [0006] and [0007]; page 3, paragraphs [0025] and [0026]).

Regarding claim 99, as well as the claim may be understood with respect to 35 U.S.C. 112, discussed above, Wang et al. further disclose that the devices are optical switch equipment constructed to use a transparent optical switch (Figure 2; page 2, paragraphs [0016]).

8. Claims 10-12, 19, 20, 50, 51, 58, 59, 66, 70, 71, 73-75, 82-84, 87, 89, 109, 110, 112, 118, and 119 are rejected under 35 U.S.C. 102(b) as being anticipated by Sharma et al. (US 6,046,833 A).

Regarding claim 10, Sharma et al. disclose a communication network having a plurality of optical communication devices connected with each other (Figures 6 and 13), comprising:

a first uni-directional in-band control channel provided in every downstream optical links (using transmitters 185) leading from the output interfaces of one of adjoining first and second optical communication devices (i.e., optical switches 150 in each node 120 as shown in detail in Figure 13) to the input interfaces of the other of the first and second optical communication

devices, between the interfaces of the first and second optical communication devices along and for the every downstream optical links (column 16, lines 23-67); and

a second uni-directional in-band control channel provided in every upstream optical links (using transmitters 185) leading from the output interfaces of the other of the first and second optical communication devices 150 to the input interfaces of the one of the first and second optical communication devices, between the interfaces of the first and second optical communication devices along and for the every upstream optical links and directed in the direction opposite to the control channel in the downstream optical links (column 16, lines 23-67),

wherein the first and second optical communication devices include:

control channel terminators (receivers 165) for terminating the first and second uni-directional in-band control channels, respectively (column 16, lines 38-43); and

optical link controllers (control logic 170) for administering the every optical links by exchanging control messages through the control channel terminator (column 16, lines 23-67).

Examiner respectfully notes that although Figure 13 shows only one node 120, Sharma et al. disclose that the elements in node 120 communicate with corresponding similar nodes in upstream and downstream directions as shown in Figure 6.

Regarding claim 50, as similarly discussed above with regard to claim 10, Sharma et al. disclose a WDM transmission equipment (Figures 6, 13, and 16A-C) for forming an optical multiplex section (the elements of WDM terminal 205 shown in Figure 16B; column 19, lines 8-44) together with opposed devices (i.e., optical switches 150 in each node 120 as shown in

Figure 13 and shown in Figure 16B as OSN sub-modules 210) and an arbitrary number of optical amplifiers 215 and 235 between the opposed devices, comprising:

a uni-directional in-band control channel provided in the optical multiplex section between the input/output ports of the opposed devices and along all optical links through the optical multiplex section (using transmitters 185 as shown in Figure 13; column 16, lines 23-67);

a control channel terminator (receivers 165) for terminating the uni-directional in-band control channel (column 16, lines 38-43); and

optical link controllers (control logic 170) for administering the every optical links by exchanging control messages through the control channel terminators (column 16, lines 23-67).

Again, although Figure 13 shows only one node 120 and Figures 16B shows only one WDM terminal 205, Sharma et al. disclose that the elements in node 120 communicate with corresponding similar nodes in upstream and downstream directions as shown in Figure 6.

Regarding claim 58, as similarly discussed above with regard to claims 1 and 10, Sharma et al. disclose a WDM transmission equipment (Figures 6, 13, and 16A-C) for forming an optical multiplex section (the elements of WDM terminal 205 shown in Figure 16B; column 19, lines 8-44) together with opposed devices for transmitting downstream and upstream signals, respectively (i.e., optical switches 150 in each node 120 as shown in Figure 13 and shown in Figure 16B as OSN sub-modules 210), and an arbitrary number of optical amplifiers 215 and 235 between the opposed devices, comprising:

a first uni-directional in-band control channel provided in the optical multiplex section between the input/output ports of the opposed devices and along all downstream optical links

through the optical multiplex section (using transmitters 185 as shown in Figure 13; column 16, liens 23-67);

a second uni-directional in-band control channel provided in the optical multiplex section between the input/output ports of the opposed devices and along all upstream optical links through the optical multiplex section and directed in the direction opposite to the control channels in the downstream optical links (using transmitters 185 as shown in Figure 13; column 16, lines 23-67);

a control channel terminator (receivers 165) for terminating the first and second uni-directional in-band control channel (column 16, lines 38-43); and

optical link controllers (control logic 170) for administering the every optical links by exchanging control messages through the control channel terminators (column 16, lines 23-67).

Again, although Figure 13 shows only one node 120 and Figures 16B shows only one WDM terminal 205, Sharma et al. disclose that the elements in node 120 communicate with corresponding similar nodes in upstream and downstream directions as shown in Figure 6.

Regarding claim 109, as similarly discussed above with regard to claims 10, 50, and 58, Sharma et al. disclose an optical switch equipment connected with adjoining optical communication devices (Figures 6 and 13), comprising:

a first uni-directional in-band control channel provided in every downstream optical links (using transmitters 185) leading from output interfaces to the input interfaces of the adjoining optical communication devices, between the interfaces of the adjoining optical communication devices for the every downstream optical links;

a second uni-directional in-band control channel provided in every upstream optical links (using transmitters 185) leading from the output interfaces of the adjoining optical communication devices to the input interfaces of the own device, between the interfaces of the adjoining optical communication devices for the every upstream optical links and directed in the direction opposite to the control channel in the downstream optical links;

control channel terminators (receivers 165) for terminating the first and second uni-directional in-band control channels (column 16, lines 38-43); and

optical link controllers (control logic 170) for administering the every optical links by exchanging control messages through the control channel terminators (column 16, lines 23-67).

Again, although Figure 13 shows only one node 120, Sharma et al. disclose that the elements in node 120 communicate with corresponding similar nodes in upstream and downstream directions as shown in Figure 6.

Regarding claim 19, Sharma et al. disclose a communication network having a plurality of optical communication devices connected with each other (Figures 6, 13, 17A-B, and 18), comprising:

a bi-directional in-band control channel provided in every optical links (using transmitters 185 as shown in Figures 13, 17A-B, and 18), leading from the output interfaces of one of adjoining first and second optical communication devices to the input interfaces of the other of the first and second optical communication devices, between the interfaces of the first and second optical communication devices along and for the every optical links (column 19, lines 64-67; column 20, lines 1-52), wherein the first and second optical communication devices include:

a control channel terminator (receivers 165) for terminating the bi-directional in-band control channels; and

optical link controllers (control logic 170) for administering the every optical links by exchanging control messages through the control channel terminators.

Again, although Figure 13 shows only one node 120, Sharma et al. disclose that the elements in node 120 communicate with corresponding similar nodes in upstream and downstream directions as shown in Figure 6. Also, although Figure 13 shows an embodiment having uni-directional control channels, Sharma et al. disclose bi-directional control channels may be used instead, as shown in Figures 17A-B and 18.

Regarding claim 66, as similarly discussed above with regard to claim 19, Sharma et al. disclose a WDM transmission equipment (Figures 6, 13, 16A-C, 17A-B, and 18) for forming an optical multiplex section (the elements of WDM terminal 205 shown in Figure 16B; column 19, lines 8-44) together with opposed devices (i.e., optical switches 150 in each node 120 as shown in Figure 13 and shown in Figure 16B as OSN sub-modules 210) and an arbitrary number of optical amplifiers 215 and 235 between the opposed devices, comprising:

a bi-directional in-band control channel provided in the optical multiplex section between the input/output ports of the opposed devices and along all optical links through the optical multiplex section (using transmitters 185 as shown in Figures 13, 17A-B, and 18; column 19, lines 64-67; column 20, lines 1-52);

a control channel terminator (receivers 165) for terminating the bi-directional in-band control channel; and

optical link controllers (control logic 170) for administering the every optical links by exchanging control messages through the control channel terminators.

Again, although Figure 13 shows only one node 120, Sharma et al. disclose that the elements in node 120 communicate with corresponding similar nodes in upstream and downstream directions as shown in Figure 6. Also, although Figure 13 shows an embodiment having uni-directional control channels, Sharma et al. disclose bi-directional control channels may be used instead, as shown in Figures 17A-B and 18.

Regarding claim 118, as similarly discussed above with regard to claims 19 and 166, Sharma et al. disclose an optical switch equipment connected with adjoining optical communication device (Figures 6, 13, 17A-B, and 18), comprising:

a bi-directional in-band control channel provided in every optical links leading from output interfaces to the input interfaces of the adjoining optical communication devices, between the interfaces of the adjoining optical communication devices for the every optical links (using transmitters 185 as shown in Figures 13, 17A-B, and 18; column 19, lines 64-67; column 20, lines 1-52);

a control channel terminator (receivers 165) for terminating a bi-directional in-band control channel; and

optical link controllers (control logic 170) for administering the every optical links by exchanging control messages through the control channel terminators.

Again, although Figure 13 shows only one node 120, Sharma et al. disclose that the elements in node 120 communicate with corresponding similar nodes in upstream and downstream directions as shown in Figure 6. Also, although Figure 13 shows an embodiment

having uni-directional control channels, Sharma et al. disclose bi-directional control channels may be used instead, as shown in Figures 17A-B and 18.

Regarding claim 70, Sharma et al. disclose an optical link attribute state administrating method for a communication network having a plurality of optical communication devices connected with each other (Figures 6 and 13), comprising:

defining an optical link section leading from the output interfaces of a first optical communication device of a transmission source to the input interfaces of an adjoining second optical communication device (i.e., links between nodes 120 as shown in Figure 6);

providing in-band control channels for every optical links between the first and second optical communication devices (using transmitters 185 as shown in Figure 13); and

exchanging the optical link attributes, as specified by the interfaces of the first and second optical communication devices, as control messages through the in-band control channels (column 16, lines 23-67).

Regarding claim 73, as similarly discussed above with regard to other claims, Sharma et al. further disclose:

providing a first uni-directional in-band control channel in every downstream optical links leading from the output interfaces of one of the first and second optical communication devices to the input interfaces of the other of the first and second optical communication devices, between the interfaces of the first and second optical communication devices and the ports of a WDM transmission equipment connected with the interfaces, along and for the every downstream optical links (using transmitters 185 as shown in Figure 13);

providing a second uni-directional in-band control channel in every upstream optical links leading from the output interfaces of the other of the first and second optical communication devices to the input interfaces of the one of the first and second optical communication devices, between the interfaces of the first and second optical communication devices along and for the every upstream optical links and directed in the direction opposite to the control channel in the downstream optical links (using transmitters 185 as shown in Figure 13);

terminating the first and second uni-directional in-band control channels at control channel terminators (receivers 165); and

causing optical link controllers (control logic 170) to administer the every optical links by exchanging control messages through the control channel terminators (column 16, lines 23-67).

Regarding claim 74, as similarly discussed above with regar dto other claims, Sharma et al. further disclose:

providing a bi-directional in-band control channel in every optical links leading from the output interfaces of one of the first and second optical communication devices to the input interfaces of the other of the first and second optical communication devices, between the interfaces of the first and second optical communication devices along and for the every optical links (using transmitters 185 as shown in Figures 13, 17A-B, and 18; column 19, lines 64-67; column 20, lines 1-52);

terminating the bi-directional in-band control channels at a control channel terminator (receivers 165); and

causing optical link controllers (control logic 170) to administer the every optical links by exchanging control messages through the control channel terminators (column 16, lines 23-67; column 19, lines 64-67; column 20, lines 1-52).

Regarding claim 82, Sharma et al. disclose an optical link attribute/state administrating method for a communication network (Figures 6, 13, and 16A-C) having a plurality of optical communication devices connected with each other through a WDM transmission equipment (i.e., WDM terminals as shown in Figure 16B), comprising:

defining an optical link section leading from the output interfaces of a first optical communication device of a transmission source to the input interfaces of an adjoining second optical communication device (i.e., links between nodes 120 as shown in Figure 6);

providing in-band control channels for every optical links along optical links between the first and second optical communication devices and an optical multiplex section (using transmitters 185 as shown in Figure 13; column 16, lines 23-67); and

exchanging the optical link attributes, as specified by the interfaces of the first and second optical communication devices, and the optical link attributes, as specified by the optical multiplex section, as control messages through the in-band control channels (column 16, lines 23-67).

Regarding claims 84 and 87, as well as claim 87 may be understood with respect to 35 U.S.C. 112, discussed above, Sharma et al. disclose that the optical multiplex section (including WDM terminal shown in Figure 16B) includes: at least one set of opposed WDM transmission equipments (including demultiplexer 220 and multiplexer 230); and an arbitrary number of optical amplifiers 215 and 235 between the opposed WDM transmission equipments.

Although Figure 16B only shows one side of "opposed" WDM transmission equipments, Figure 6 shows how nodes with similar WDM terminals are connected to each other in upstream and downstream directions.

Regarding claims 11, 20, 71, 112, and 119, Sharma et al. disclose that at least one of the first and second optical communication devices is an optical switch equipment which is constructed to use a transparent optical switch (such as optical switch 150 in node 120 as shown in Figure 13).

Regarding claim 83, Sharma et al. disclose that the first and second optical communication devices adjoin and are connected with each other through the optical multiplex section (Figure 6 shows nodes 120 connected to each other), and at least one of the same is an optical switch equipment which is constructed to use a transparent optical switch equipment (such as optical switch 150 in node 120 as shown in Figure 13).

Regarding claims 12, 51, 59, 75, 89, and 110, Sharma et al. disclose that the signal wave band of the data channel on the optical links and the signal wave band of the uni-directional in-band control channels are different and the interfaces of the first and second optical communication devices include WDM couplers (such as multiplexers 180) for demultiplexing/multiplexing the two difference wave bands in all the optical links (Figure 13; column 16, lines 58-61).

Claim Rejections - 35 USC § 103

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person

having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

10. Claims 13, 52, 60, 62, 76, 90, and 111 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sharma et al. in view of Horiuchi et al. (US 6,185,020 A).

Regarding claims 13, 52, 60, 62 (note double patenting objection above), 76, 90, and 111, Sharma et al. disclose a system as discussed above with regard to claims 12, 51, 59, 75, 89, and 110 including optical transmitters 185 and receivers 165 for transmitting and receiving control messages (Figure 13). They do not specifically disclose 1xN optical switches for time-division sharing the transmitter or receiver among control channels.

However, Horiuchi et al. teach a system related to the one disclosed by Sharma et al. including transmitting additional channels on a plurality of data channels in an optical communication system. They further teach using one transmitter 220 for the additional channels and a 1xN optical switch 222 for time-division sharing the transmitter among the multiple channels (Figure 12; column 11, lines 55-67; column 12, lines 1-19).

Regarding claims 13, 52, 60, 62, 76, 90, and 111, it would have been obvious to a person of ordinary skill in the art to use an arrangement including a 1xN optical switch as taught by Horiuchi et al. in the system disclosed by Sharma et al. in order to efficiently use fewer transmitters for transmitting messages on the control channels disclosed by Sharma et al. and thereby reduce costs in the system.

11. Claims 14, 53, 61, 77, 91, and 113 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sharma et al. in view of Sasaki et al. (US 6,771,904 B1).

Regarding claims 14, 53, 61, 77, 91, and 113, Sharma et al. discloses a system as discussed above with regard to claims 10, 50, 58, 70, 82, and 109 including a data channel and

in-band control channels but do not specifically disclose that the wave band of the a data channel and in-band control channels are identical. They also do not specifically disclose 1x2 optical switches switching between the data and control channels.

However, Sasaki et al. teach a system related to the one disclosed by Sharma et al. including transmitting a data signal and additional signal on the same path in an optical communication system (Figure 8). Sasaki et al. further teach that the data signal and the additional signal may have the same wave band and share the optical path using a switch (column 12, lines 16-55). Regarding claims 14, 53, 61, 77, 91, and 113, it would have been obvious to a person of ordinary skill in the art to use a switch as suggested by Sasaki et al. instead of the wavelength division multiplex couplers in the system disclosed by Sharma et al. in order to selectively activate control channels as needed (such as to test the availability of optical paths as taught by Sasaki et al.; column 1, lines 10-34).

12. Claims 15, 54, 78, 92, and 114 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sharma et al. in view of Sasaki et al. as applied to claims 14, 53, 77, 91, and 113 above, and further in view of Horiuchi et al.

Regarding claims 15, 54, 78, 92, and 114, Sharma et al. in view of Sasaki et al. describe a system as discussed above with regard to claims 14, 53, 77, 91, and 113, including optical transmitters 185 and receivers 165 for transmitting and receiving control messages (Sharma et al., Figure 13). They do not specifically disclose 1xN optical switches for time-division sharing the transmitter or receiver among control channels.

However, Horiuchi et al. teach a system related to the one disclosed by Sharma et al. including transmitting additional channels on a plurality of data channels in an optical

communication system. They further teach using one transmitter 220 for the additional channels and a 1xN optical switch 222 for time-division sharing the transmitter among the multiple channels (Figure 12; column 11, lines 55-67; column 12, lines 1-19).

Regarding claims 15, 54, 78, 92, and 114, it would have been obvious to a person of ordinary skill in the art to use an arrangement including a 1xN optical switch as taught by Horiuchi et al. in the system described by Sharma et al. in view of Sasaki et al. in order to efficiently use fewer transmitters for transmitting messages on the control channels disclosed by Sharma et al. and thereby reduce costs in the system.

13. Claims 1-3, 72, and 100-102 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sharma et al. in view of Wing So (US 2002/0109879 A1).

Regarding claim 1, Sharma et al. disclose a communication network (Figures 6 and 13) having a plurality of optical communication devices (such as optical switches 150 in each node 120 as shown in detail in Figure 13) connected with each other, comprising:

uni-directional in-band control channels provided in every optical links leading from the output interfaces of one of adjoining first and second optical communication devices to the input interfaces of the other of the first and second optical communication devices, between the interfaces of the first and second optical communication devices along and for the every optical links (provided using transmitters 185; column 16, lines 23-67);

wherein the first and second optical communication devices include:

control channel terminators (receivers 165) for terminating the uni-directional in-band control channels (column 16, lines 38-43); and

optical link controllers (control logic 170)for administering the every optical links by exchanging control messages through the control channel terminators (column 16, lines 23-67).

Examiner respectfully notes that although Figure 13 shows only one node 120, Sharma et al. disclose that the elements in node 120 communicate with corresponding similar nodes in upstream and downstream directions as shown in Figure 6.

Regarding claim 72, as similarly discussed above with regard to claim 1, Sharma et al. disclose a method as discussed above with regard to claim 70 and further disclose;

providing uni-directional in-band control channels in every optical links leading from the output interfaces of one of the first and second optical communication devices to the input interfaces of the other of the first and second optical communication devices, between the interfaces of the first and second optical communication devices along and for the every optical links (using transmitters 185; column 16, lines 23-67);

terminating the uni-directional in-band control channels at control channel terminators (receivers 165; column 16, lines 38-43); and

causing optical link controllers (control logic 170) to administer the every optical links by exchanging control messages through the control channel terminators (column 16, lines 23-67).

Regarding claim 100, as similarly discussed above with regard to claims 1 and 72, Sharma et al. disclose an optical switch equipment connected with adjoining optical communication device (Figures 6 and 13), comprising:

uni-directional in-band control channels provided in every optical links leading from output interfaces to the input interfaces of the adjoining optical communication devices, between

the interfaces of the adjoining optical communication devices for the every optical links (provided using transmitters 185; column 16, lines 23-67);

control channel terminators (receivers 165) for terminating a uni-directional in-band control channel (column 16, lines 38-43); and

optical link controllers (control logic 170) for administering the every optical links by exchanging control messages through the control channel terminators (column 16, lines 23-67).

Regarding claims 1, 72, and 100, Sharma et al. disclose in-band control channels but do not specifically disclose an out-band control channel provided between optical communication devices.

However, Wing So teaches a system related to the one disclosed by Sharma et al. including a communication network having a plurality of optical communications devices connected with each other wherein the devices exchange messages on in-band control channels (Figure 1; page 1, paragraph [0006]). Wing So further teaches that the devices may further communicate on out-band control channels in addition to in-band control channels (page 15, paragraphs [0338-0339]; page 21, paragraph [0452]).

It would have been obvious to a person of ordinary skill in the art to include an out-band control channel as taught by Wing So in addition to the in-band control channel in the system disclosed by Sharma et al. in order to provide additional control information, such as information separate from information on the in-band channel, between the devices in the network.

Regarding claims 2 and 101, Sharma et al. disclose that at least one of the first and second optical communication devices is an optical switch equipment which is constructed to use a transparent optical switch (such as optical switch 150 in node 120 as shown in Figure 13).

Regarding claims 3 and 102, Sharma et al. disclose that the signal wave band of the data channel on the optical links and the signal wave band of the uni-directional in-band control channels are different and the interfaces of the first and second optical communication devices include WDM couplers (such as multiplexers 180) for demultiplexing/multiplexing the two difference wave bands in all the optical links (Figure 13; column 16, lines 58-61).

14. Claims 4 and 103 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sharma et al. in view of Wing So as applied to claims 3 and 102 above, and further in view of Horiuchi et al..

Regarding claims 4 and 103, Sharma et al. in view of Wing So describe a system as discussed above with regard to claims 3 and 102 including optical transmitters 185 and receivers 165 for transmitting and receiving control messages (Sharma et al., Figure 13). They do not specifically disclose 1xN optical switches for time-division sharing the transmitter or receiver among control channels.

However, Horiuchi et al. teach a system related to the one disclosed by Sharma et al. including transmitting additional channels on a plurality of data channels in an optical communication system. They further teach using one transmitter 220 for the additional channels and a 1xN optical switch 222 for time-division sharing the transmitter among the multiple channels (Figure 12; column 11, lines 55-67; column 12, lines 1-19).

Regarding claims 4 and 103, it would have been obvious to a person of ordinary skill in the art to use an arrangement including a 1xN optical switch as taught by Horiuchi et al. in the system described by Sharma et al. in view of Wing So in order to efficiently use fewer

transmitters for transmitting messages on the control channels disclosed by Sharma et al. and thereby reduce costs in the system.

15. Claims 5 and 104 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sharma et al. in view of Wing So as applied to claims 1 and 100 above, and further in view of Sasaki et al..

Regarding claims 5 and 104, Sharma et al. in view of Wing So describe a system as discussed above with regard to claims 1 and 100 including a data channel and in-band control channels but do not specifically disclose that the wave band of the a data channel and in-band control channels are identical. They also do not specifically disclose 1x2 optical switches switching between the data and control channels.

However, Sasaki et al. teach a system related to the one disclosed by Sharma et al. including transmitting a data signal and additional signal on the same path in an optical communication system (Figure 8). Sasaki et al. further teach that the data signal and the additional signal may have the same wave band and share the optical path using a switch (column 12, lines 16-55). Regarding claims 5 and 104, it would have been obvious to a person of ordinary skill in the art to use a switch as suggested by Sasaki et al. instead of the wavelength division multiplex couplers in the system described by Sharma et al. in view of Wing So in order to selectively activate control channels as needed (such as to test the availability of optical paths as taught by Sasaki et al.; column 1, lines 10-34).

16. Claims 6 and 105 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sharma et al. in view of Wing So and Sasaki et al. as applied to claims 5 and 104 above, and further in view of Horiuchi et al.

Regarding claims 6 and 105, Sharma et al. in view of Wing So and Sasaki et al. describe a system as discussed above with regard to claims 5 and 104 including optical transmitters 185 and receivers 165 for transmitting and receiving control messages (Sharma et al., Figure 13). They do not specifically disclose 1xN optical switches for time-division sharing the transmitter or receiver among control channels.

However, Horiuchi et al. teach a system related to the one disclosed by Sharma et al. including transmitting additional channels on a plurality of data channels in an optical communication system. They further teach using one transmitter 220 for the additional channels and a 1xN optical switch 222 for time-division sharing the transmitter among the multiple channels (Figure 12; column 11, lines 55-67; column 12, lines 1-19).

Regarding claims 6 and 105, it would have been obvious to a person of ordinary skill in the art to use an arrangement including a 1xN optical switch as taught by Horiuchi et al. in the system described by Sharma et al. in view of Wing So and Sasaki et al. in order to efficiently use fewer transmitters for transmitting messages on the control channels disclosed by Sharma et al. and thereby reduce costs in the system.

Allowable Subject Matter

17. Claims 24-49 are allowed.

18. Claims 85, 86, and 88 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

19. Claims 7-9, 16-18, 21-23, 55-57, 63-65, 67-69, 79-81, 93-96, 106-108, 115-117, and 120-122 are objected to as being dependent upon a rejected base claim, but would be allowable if

rewritten in independent form including all of the limitations of the base claim and any intervening claims.

20. The following is a statement of reasons for the indication of allowable subject matter:

The prior art, including Sharma et al., does not specifically disclose or fairly suggest a system including all the elements and limitations recited in claims 24, 34, and 44, particularly including a second uni-directional or bi-directional in-band control channel in the optical multiplex section between the ports of opposed WDM transmission equipment (in addition to a first one as recited between first and second optical communications device); and further wherein the opposed WDM transmission equipment include control channel terminators and link controllers (in addition to similar elements in first and second optical communication devices).

The prior art also does not specifically disclose or fairly suggest a method including all the steps and limitations recited in claims 85, 86, 88, as well as the claims may be understood with respect to 35 U.S.C. 112, discussed above, and including all the limitations of the parent claims on which they depend, for similar reasons as given above with regard to apparatus claims 24, 34, and 44.

The prior art also does not specifically disclose or fairly suggest a system and method including all the elements, steps, and limitations recited in claims 7, 16, 21, 55, 63, 67, 79, 93, 106, 115, and 120 (and including all the limitations of the parent claims on which they depend), particularly wherein optical link controllers administer link attribute tables, discover link attributes with control messages, and set up links in initial, useable, or unusable states in the specific way recited in those claims.

Conclusion

21. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Christina Y. Leung whose telephone number is 571-272-3023. The examiner can normally be reached on Monday to Friday, 6:30 to 3:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jason Chan can be reached on 571-272-3022. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 571-272-2600.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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